1873MNRAS..34...73T

attempted to read the title page of the *Nautical Almanac* for 1873 in the moonlight with the unassisted eye, but could not at the ordinary reading distance distinguish the separate letters of the words "Nautical Almanac." I did not succeed in doing so till 10h. 19m., or about 10 minutes after the end of the total phase. The letters of the title page down to "with an appendix" inclusive, could be readily distinguished at 10h. 43m., but this was not the case with letters as small as those contained in the words "containing elements and ephemerides." The larger Magellanic Cloud and the brighter portions of the *Milky Way* were barely visible at 10h. 45m. Seventeen minutes later they had quite vanished from view. Three minutes after the time of last contact the whole of the title page of the *Nautical Almanac* could be made out with the greatest ease. During the partial phase subsequent to the total immersion, the edge of the shadow was of a deep grey tint approaching to slate-blue, and the interior part of a coppery colour. The observations of the contacts and occultations were made with a refractor of $4\frac{1}{2}$-inches aperture, and 70-inches focal length, provided with a power of about 55. The instrument is the work of Messrs. Cooke and Sons, of York.

Observatory, Windsor, New South Wales,
1873. *August* 14.

Observations of Jupiter's Third Satellite. By John Tebbutt, Esq.

While engaged on the 1st of April last, with my $4\frac{1}{2}$-inch equatoreal in observing the transits of *Jupiter's* first and third satellites, I was much struck with the appearance presented by the latter body. With a power of 265 on the equatoreal I could see that the satellite was at 7h. $40\frac{1}{2}$m. just within the disk. With the same power I also observed the first and last contacts of the first satellite at ingress. These took place at 8h. $3\frac{1}{2}$m. and 8h. $5\frac{1}{2}$m. respectively, but the planet's limb was at the time ill-defined. Although the third satellite was distinctly visible as a bright spot when just within the limb, it afterwards disappeared, being undistinguishable from the disk of its primary. I now removed the eye-piece and substituted for it another having a power of 180. On looking at the planet at 8h. $15\frac{1}{2}$m., I was surprised to find not only the first satellite visible as a bright spot just within the disk, but also a little in advance of it a round and very dark spot, which from its position I immediately concluded to be the third satellite. Retaining the power of 180, I watched the phenomenon till the satellite completed its transit. The most interesting circumstance is, that the satellite maintained its blackness throughout the transit, and that it was difficult to

Downloaded from http://mnras.oxfordjournals.org/ at UCSF Library on April 21, 2015

© Royal Astronomical Society • Provided by the NASA Astrophysics Data System

1873MNRAS..34...73T

decide which was the more intense the blackness of the satellite or that of the shadow of the first satellite, which was projected at the same time on the disk, and therefore admitted of direct comparison. The third satellite was very near the centre of *Jupiter's* disk at 9h. 16¼m. At 10h. 13¾m., and for a long time afterwards, I noticed that the shadow of the first satellite was projected on one of the dusky belts of the planet, and was surrounded with a ring of faint light. This phenomenon was probably the effect of contrast. Considering the transit of a satellite as a dark spot to be of rare occurrence, I immediately called the attention of our amateurs to the circumstance, with a request that those who were possessed of suitable telescopes should watch the next transit of the third satellite on the 8th of the same month. One observer attempted to carry out the suggestion, but was unsuccessful owing to atmospheric causes. I was, however, more fortunate, for the satellite was again observed by me to transit its primary as a black spot on the 8th of April and 14th of May. Very full notes, with sketches, were taken during the transits. I determined pretty accurately the time when the satellite began to assume the dark appearance. The following observations were made:—

	Local Mean Time. d	h	m	s
First contact at ingress	April 8	11	5	15
Bisection at ingress	,,	11	8	15
Last contact at ingress	,,	11	10	45
Satellite hardly distinguishable . . .	,,	11	20	13
Satellite quite undistinguishable . . .	,,	11	26	13
Beginning of dark phase	,,	11	38	7
First contact at ingress	May 14	6	10	20
Last contact at ingress	,,	6	16	20
Satellite visible as a very faint luminous spot	,,	6	23	20
Satellite quite undistinguishable . . .	,,	6	27	20
Beginning of dark phase	,,	6	46	40

By "beginning of dark phase" is to be understood the instant when the satellite first became perceptible as a faint dark spot. Its darkness increased gradually in intensity on both occasions, till at length the satellite became as black as the ordinary shadows in transit.

It appears from communications by Messrs. Denning and Roberts to the *Astronomical Register* and the *Monthly Notices* respectively, that the same phenomenon was observed in connexion with the transit of the fourth satellite on the 26th of March last.

Observatory, Windsor, N. S. Wales,
1873, *August* 14.

Downloaded from http://mnras.oxfordjournals.org/ at UCSF Library on April 21, 2015

© Royal Astronomical Society • Provided by the NASA Astrophysics Data System